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10/558,361

11/25/2005

Shigeyuki Ikeda

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EXAMINER

SONG, HOON K

ART UNIT

PAPER NUMBER

2882

NOTIFICATION DATE

DELIVERY MODE

07/13/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

Application No.

10/558,361

Applicant(s)

IKEDA, SHIGEYUKI

Examiner

Hoon Song

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-9 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagai (US 2004/0008817A1) in view of Horbaschek (US 5412704).

Regarding claim 1, Nagai teaches an x-ray diagnostic imaging system comprising:

an x-ray irradiation unit 21 for irradiating an object to be examined with x-rays;

an x-ray diaphragm unit 22 disposed in a direction of x-ray irradiation of the x-ray irradiation unit and shielding the irradiated x-rays except for the x-rays irradiated on a portion used for obtaining an x-ray image of the object to be examined;

an x-ray setting unit (paragraph 35);

an x-ray flat panel detector 25 opposed to the x-ray irradiation unit via the object 13 to be examined and imaging x-rays passed through the object to be examined as an x-ray image;

an image processing unit for subjecting the x-ray image obtained by the x-ray flat panel detector to an image processing; and

a display unit 33 displaying the x-ray image subjected to the image processing by the image processing unit,

wherein the image processing unit comprises: a calculation unit reading out data of an x-ray detection element of the x-ray flat panel detector corresponding to the x-ray shielded portion shielded by the x-ray diaphragm unit (41, invalid area) which is variably set by the x-ray setting unit and calculating a line noise component from the read out data of the x-ray detection element (paragraph 36); and a line noise correction unit correcting a line noise of the x-ray image based on the line noise component calculated by the calculation unit (paragraph 41, 42, 50, 51).

However Nagai fails to teach an x-ray diaphragm setting unit for variably setting the x-ray shielded portion to be shielded by the x-ray diaphragm unit.

Horbaschek teaches a variable diaphragm (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the setting unit of Nagai with the variable diaphragm as taught by Horbaschek, since it would reduce patient overdose.

Regarding claim 2, Nagai teaches the calculation unit includes interaction of a data portion read out as the line noise component from the x-ray flat panel detector with the x-ray diaphragm unit variably set by the x-ray diaphragm setting unit (paragraph 35, 41, 42, 50, 51).

Regarding claim 3, Nagai teaches the image processing unit further comprises a correction execution switching unit switching to execution/non-execution of the line

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noise correction based on an x-ray condition set to the x-ray irradiation unit (paragraph 41, 42, 50, 51).

Regarding claim 6, Nagai teaches an operation unit to be used by an operator for setting an x-ray condition to the x-ray irradiation unit, an aperture condition of the x-ray diaphragm unit to the x-ray diaphragm setting unit, and an operation condition to the image processing unit; and a control unit driving the x-ray irradiation unit, the x-ray diaphragm setting unit, and the image processing unit based on the conditions set by the operation unit (figure 1).

Regarding claim 7, Nagai teaches the control unit causes the x-ray irradiation unit to irradiate the object to be examined with x-rays corresponding to the x-ray condition set by the operation unit; the x-ray flat panel detector detects x-ray image data of x-rays projected by the x-ray irradiation unit and passed through the object to be examined and data of the shielded portion shielded by the x-ray diaphragm unit; and the calculation unit calculates a line noise component from the shielded portion data detected by the x-ray flat panel detector (figure 1).

Regarding claim 8, Nagai teaches the line noise component obtained by the calculation unit is a predetermined statistical value of data of the x-ray detection element of the x-ray flat panel detector, the data corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit (paragraph 41, 42, 50, 51).

Regarding claim 9, Nagai teaches the control unit controls the correction execution switching unit switching to execution/non-execution of the line noise

correction based on the x-ray condition set by the operation unit (paragraph 41, 42, 50, 51).

Regarding claim 12, Nagai teaches the line noise component obtained by the calculation unit is a predetermined statistical value of data (stray charges) of the x-ray detection element of the x-ray flat panel detector, the data corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit (paragraph 41, 42, 50, 51).

Regarding claim 13, Nagai teaches the predetermined statistical value is an average value (paragraph 41, 42, 50, 51).

Regarding claim 14, Nagai teaches the predetermined statistical value is a median (paragraph 41, 42, 50, 51).

Regarding claim 15, Nagai teaches the predetermined statistical value is a value obtained by combining plural statistical values including the average value and the median (paragraph 41, 42, 50, 51).

Claims 1-3, 6-9 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable by Ikeda et al. (US 2004/0174953A1) in view of Horbaschek.

Regarding claims 1-3, 6-9 and 12-15, Ikeda teaches an x-ray diagnostic imaging system comprising:

an x-ray irradiation unit 1 for irradiating an object to be examined with x-rays;

an x-ray flat panel detector 2 opposed to the x-ray irradiation unit via the object 13 to be examined and imaging x-rays passed through the object to be examined as an x-ray image;

an image processing unit for subjecting the x-ray image obtained by the x-ray flat panel detector to an image processing; and

a display unit 9 displaying the x-ray image subjected to the image processing by the image processing unit,

wherein the image processing unit comprises: a calculation unit reading out data of an x-ray detection element of the x-ray flat panel detector corresponding to the x-ray shielded portion shielded by the x-ray diaphragm unit (401, non-detecting area) which is variably set by the x-ray diaphragm setting unit and calculating a line noise component from the read out data of the x-ray detection element (paragraph 14); and a line noise correction unit correcting a line noise of the x-ray image based on the line noise component calculated by the calculation unit (paragraph 15, 17 and 19).

However Nagai fails to teach an x-ray diaphragm setting unit for variably setting the x-ray shielded portion to be shielded by the x-ray diaphragm unit.

Horbaschek teaches a variable diaphragm (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the setting unit of Nagai with the variable diaphragm as taught by Horbaschek, since it would reduce patient overdose.

Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagai in view of Danielsson (US 2002/0057761A1).

Regarding claim 5, Nagai fails to teach a second x-ray diaphragm unit disposed between the object to be examined and the x-ray flat panel detector in addition to the x-ray diaphragm unit and shielding the x-rays scattered by the object to be examined, wherein the x-ray diaphragm setting unit variably sets a size of an x-ray shielded portion shielded by the second x-ray diaphragm unit.

Danielsson teaches a second diaphragm 104 disposed between an object 103 and a detector 106.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the imaging system of Nagai with the second diaphragm as taught by Danielsson, since the second diaphragm would provide a better alignment.

Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagai in view of Fivez (US 5602895).

Regarding claims 4 and 10, Nagai fails to teach the image processing unit further comprises a scattered x-ray elimination processing unit identifying an area in which x-rays scattered by the object to be examined are generated on the x-ray flat panel detector corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit and eliminating the identified scattered x-ray generation area from the line noise component calculation performed by the calculation unit.

Fivez generally teaches scatter compensation in x-ray imaging.



It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the imaging system of Nagai with the scatter compensation as taught by Fivez, because it would provide better diagnostic image.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 9:30 AM - 7 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'Hoon Song', with a stylized flourish at the end.

Hoon Song  
Primary Examiner  
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